

PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

COHAUSZ & FLORACK
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D-40470 Düsseldorf
ALLEMAGNE

Date of mailing (day/month/year) 20 February 2002 (20.02.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference SC/ar 990730WO	
International application No. PCT/EP99/07210	International filing date (day/month/year) 29 September 1999 (29.09.99)

1. The following indications appeared on record concerning:		
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(19) World Intellectual Property Organization
International Bureau



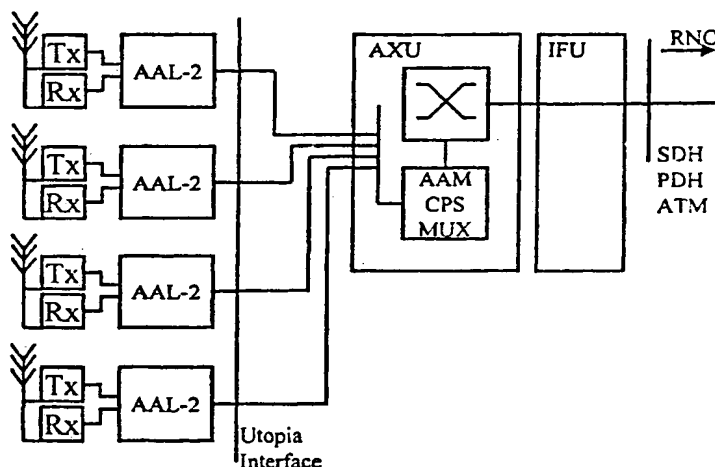
(43) International Publication Date
5 April 2001 (05.04.2001)

PCT

(10) International Publication Number
WO 01/24570 A1

- (51) International Patent Classification⁷: H04Q 11/04 (74) Agent: COHAUSZ & FLORACK; Kanzlerstrasse 8a, D-40470 Düsseldorf (DE).
- (21) International Application Number: PCT/EP99/07210 (81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date:
29 September 1999 (29.09.1999) (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (25) Filing Language: English
- (26) Publication Language: English
- (71) Applicant (*for all designated States except US*): NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).
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- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS



(57) Abstract: The invention concerns a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1, 2, 3, ...n) with physically distributed AAL-2 based termination points (TP), each termination point having an AAL-2 over ATM structure where different call IDs are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via a UTOPIA interface. In order to increase the efficiency of the system without a reduction of the maximum allowed delay, the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

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TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS

The present invention concerns telecommunication network using the W-CDMA protocol comprising a variety of base stations communicating with each other via a central Radio Network Controller by an ATM based data connection via an I_{ub} interface whereby at least one of the base stations is comprising a variety of radio sectors with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections under the control of a control unit timer with a given delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit via an UTOPIA interface.

Moreover, the invention concerns an ATM (= Asynchronous Transfer Mode) switch for a telecommunication network mentioned above as well as a method for processing data within a telecommunication network mentioned above.

The principal structure of a telecommunication network using the W-CDMA (Wideband-Code Division Multiple Access) protocol is known from practical knowledge. The structure and function of networks of that kind is known from ITU-T Recommendation I.362.2. Networks of this kind play on important role in the so called „Third Generation“ telecommunication networks.

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These kinds of networks use the AAL-2 (= ATM Adaptation Layer) over ATM standards as the protocols for broadband transmission. There are usually a variety of different base stations within the W-CDMA network each of which defining a cell. A cell, especially a cell covering an area with dense traffic can be divided into a number of sectors. Each of the sectors contains its own termination point for the AAL over ATM data. To each call in a given sector of a base station a call identification (call ID, CID) is allocated and a number of calls within a given sector is mapped into a single ATM virtual connection under use of the call ID.

The multiplexing/mapping of the different calls into one single ATM virtual connection at the respective termination point is governed by a control unit. The control unit comprises a control unit timer (CU timer) which supervises the mapping of the calls into the ATM cell which has a given length (53 bits, were 48 bits are reserved for the payload). Each ATM cell is filled with the data coming from different calls within a given sector until the ATM cell is full or the allowed CU timer limit is achieved which means that the given CU time is expired. The reason for the timer is to guarantee a maximum delay in the process of filling up the ATM cells in case if there are not enough data from the calls to be transmitted. This means, if the CU timer time expires, when the ATM cell is not yet filled, the ATM cell is transmitted only partially filled which results in a reduced efficiency.

This means, that a small value of the CU timer has the advantage that only small delay in the process of filling up the ATM cells is achieved but, that the probability of generating only partially filled cells is increased.

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On the other hand, if the CU timer is set to a larger value, the probability of generating only partially filled cells is reduced but this does not guarantee the required maximum delay time. In an extrapolation, if the time delay of the CU timer would be infinite, the probability of filling all cells is 100 percent, which would result in the best efficiency of the ATM network.

An other problem raising is that the amount of simultaneous calls that a single sector of a base station has to handle may not be enough to make the usage of the ATM bandwidth effective enough. Theoretical valuations have shown that the use of AAL-2 over ATM technology is only efficient if the number of CIDs in a single ATM virtual connection is at least 50.

It is therefore the object of the present invention to increase the efficiency of the telecommunication network without a drop of the required maximum delay time.

This object is achieved in a system mentioned above by the ATM switching unit comprising a multiplexing unit for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

Accordingly, this object is achieved by a method for operating a network mentioned above by the parallel incoming ALL-2 connections of different termination points of one base station being multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

It is the central idea of the present invention to propose a system and a method to increase the bandwidth

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usage efficiency by combining the parallel data traffic coming from different sectors of one base station before it is processed by the ATM switch. The incoming parallel data streams from the physically distributed termination points at the AAL-2 layer are multiplexed at a centralized location which leads to a very high efficiency because now - also for non-infinite delay times - the ATM virtual connections are processed with a very high occupancy rate. Nevertheless, the different sectors of the base station are still able to generate AAL-2 cells and transfer them to the multiplexing unit by using the standard UTOPIA interface. For all parallel data paths parts before the multiplexer, the CU time for mapping the AAL cells can be selected small so that low delay is guaranteed. Accordingly, at this part of the network the probability for partially filled cells is still large and a number of CID values used by the different BS sectors can still be small. After the multiplexing step, however, the number of CIDs used in the single ATM virtual connection is now significantly larger because the data stream combines all calls coming from different sectors of the base station. This means that the „dummy information“ which was contained in the AAL cells at the UTOPIA interface before the multiplexing operation is removed by which the efficiency of the whole system is remarkably enhanced.

A preferred embodiment of the system is characterized in that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers. Due to the independent CU-timers a bound in the delay across the AAL-2 layer entities is guaranteed.

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A further improvement of the described system may foresee that the CU timer used in the AAL-2 multiplexing unit has a larger value than the CU time of the parallel data streams before the multiplexing unit. By this, the probability of occupancy of the ATM cells is further increased which means that the efficiency of the bandwidth usage is further increased.

Further advantages are related to the subclaims.

It is emphasized that because of the fact that the system mentioned above is based on variable bit rated data processing, the bandwidth of each channel corresponding to a respective termination point of the base station may vary notwithstanding the fact that the system is still capable of processing the data as described above.

The invention is now illustrated by means of an embodiment as depicted in the drawings.

Fig. 1 shows a general set up of a telecommunication network according to the prior art

Fig. 2 shows a detail of Fig. 1 directed to the data processing between the base station and the radio network controller RNC

Fig. 3 shows a modification of the ATM switch unit of Fig. 2 according to the embodiment of the present invention

Fig. 4 illustrates the functional principles of the present invention by means of a cell diagram

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and

Fig. 5 shows the protocol stack for the multiplexing unit according to the present invention.

As can be seen from Fig. 1, in a conventional telecommunication network different base stations BS are comprised each of which defining a cell (depicted by a circle). The base stations are communicating with a central radio network controller RNC via a broadband data connection using an I_{ub} interface. Within a given cell, the identification and information of a call of a given mobile station MS is received via the antenna of a given base station, processed through a receiver in which the data are digitalized and transmitted to a termination point. From the termination point the data are transmitted to the Radio Network Controller RNC via the AAL-2 over ATM standard technology.

As also shown in Fig. 1, each cell is divided in different sectors, where as each sector has its own termination point. The division of a cell in a variety of sections is preferred for those cells which have a lot of traffic.

The data processing for a base station with a variety of sectors is shown in Fig. 2.

The calls received in the different sectors are digitalized and processed by separate units each of which having separate termination points. It is clear that the termination points are usually physically distributed, i.e. that they are located in different areas. Their distance may vary between a few centimetres up to hundreds of meters.

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Each of the data streams leaving the termination points of the different sectors of one base station are processed in parallel and are sent to an ATM switch AXU where they are processed to the I_{UB} interface communicating with the central radio network controller RNC. The data traffic between the different termination points and the ATM switch uses a known so-called „UTOPIA“ interface.

Fig. 3 shows a block diagram of a network according to the present invention. This embodiment refers to a „Third Generation“ Telecommunication Network. Generally, it corresponds to the system as described related with Fig. 2. In contrast to that, however, between each of the parallel outgoing data lines coming from the different termination points of the base station on one hand and the ATM switch AXU on the other hand, a multiplexing unit AAM CPS MUX is comprised. In this unit the different cells coming from different base station sectors are combined into the same virtual channel of an ATM cell arriving at the ATM switch.

This process is shown in Fig. 4.

The calls received in sector 1 of a given base station are named e.g. CID-1 and CID-2 and are mapped in the AAL-2 over ATM cell coming from the termination point of sector 1. It is shown that because of the fixed length of an ATM cell some space is left free „DUMMY“ which means that an only partially filled cell is transmitted from sector 1. Accordingly, from sector 2 only one call-ID (CID-3) is transmitted which means that even more of the ATM cell is transmitted unfilled. The same refers to the calls coming from sector 3 as also shown in Fig. 4.

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After the multiplexing process in unit AAM CPS MUX, ATM cells are transmitted which are completely filled because the space available in a given cell is filled with the remaining payload originating from another cell coming from a different radio sector. For example as shown in fig. 4, the first cell coming from sector 1 is filled up with the data coming from sector 2 (CID-3) until the first cell is filled and the rest of the information of CID-3 is mapped into the second ATM cell after which the rest of this second cell is filled with the traffic coming from sector 3. Therefore, the number of CID's used in a single ATM VCC is now significantly larger because it combines calls coming from different base stations sectors. Moreover, the dummy information contained before in the AAL-2 cells at the UTOPIA interface between the BS sectors and the multiplexing unit is removed.

Even if the time delay used for the coding of the AAL cells within the base station sectors is kept small in order to allow a low maximum delay, the occupancy rate of the ATM cell processed to the ATM switch, e.g. after multiplexing, is very high. By this the efficiency of the bandwidth usage of the system is significantly increased.

Fig. 5 shows the corresponding protocol stack for the multiplexing unit according to the present invention.

In the lower part of Fig. 5 the first three layers (PHY, ATM, CPS, AAL-2 Muxing) of the multiplexing unit are shown. These three layers are used by all instances of the upper layers, which are provided for each incoming data line individually.

The upper layers comprise the CPS AAL-2 layer and the SSC AAL-2 layer as well as radio interface protocol layers.

CLAIMS

1. Telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.
2. Telecommunication network according to claim 1, characterized in, that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers.

3. Telecommunication network according to claim 1 or 2, characterized in, that each of the channels of the sectors have different bandwidths.

4. Telecommunication network according to one of the proceedings claims, characterized in, that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

5. Telecommunication network according to claim 4, characterized in, that the multiplexing unit (AAM CPS MUX) is of plug-in type.

6. ATM switch for a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

7. Method for data processing in a telecommunication network using the W-CDMA protocol, the network consisting of a variety of basis stations communicating with a central radio network controller via an I_{us} interface in which the data connection between the base stations and the RNC controller uses ATM based broadband data traffic, whereby at least one of the base stations generates AAL over ATM data streams corresponding to the termination points of different radio sectors within one cell (base station), the different call ID's within the same sector being mapped into AAL-2 over ATM streams with a given delay time under control of a control unit timer, and whereby all ATM cell streams of the different sectors of one base unit are sent in parallel to an ATM switching unit via an UTOPIA interface, characterized in, that parallel incoming AAL-2 connections of the different termination points of one base station are multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

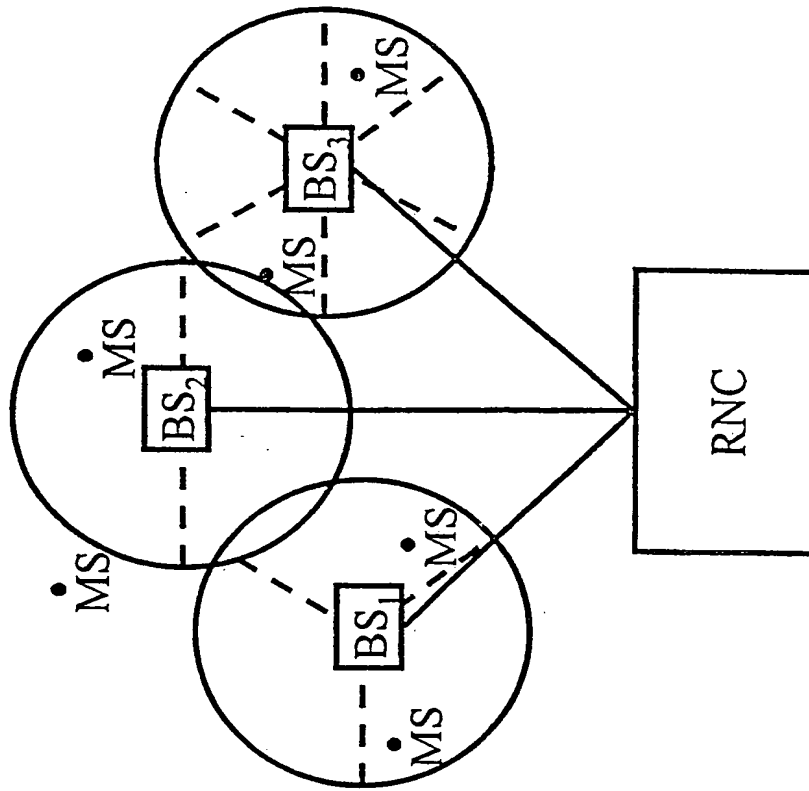


Fig. 1

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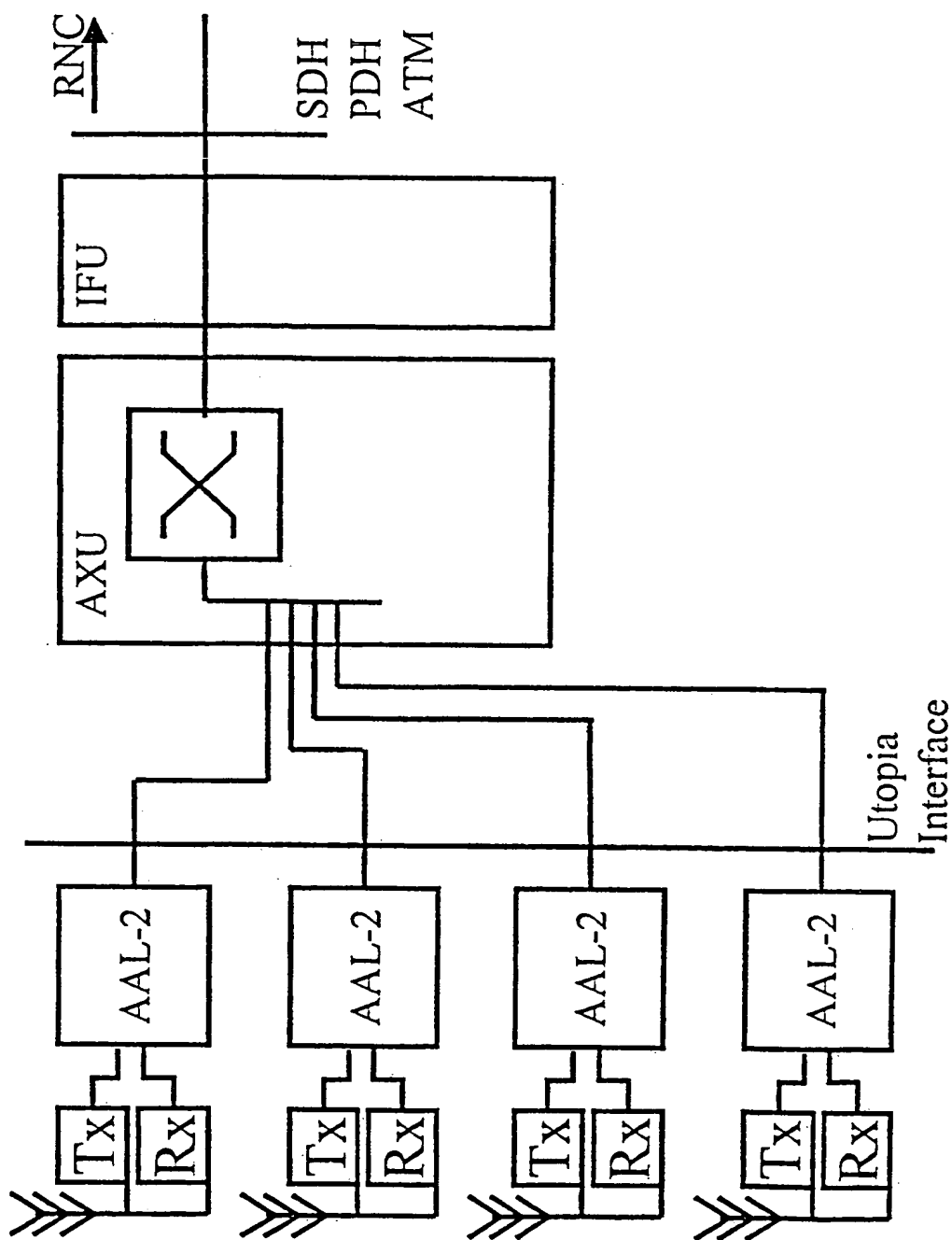


Fig. 2

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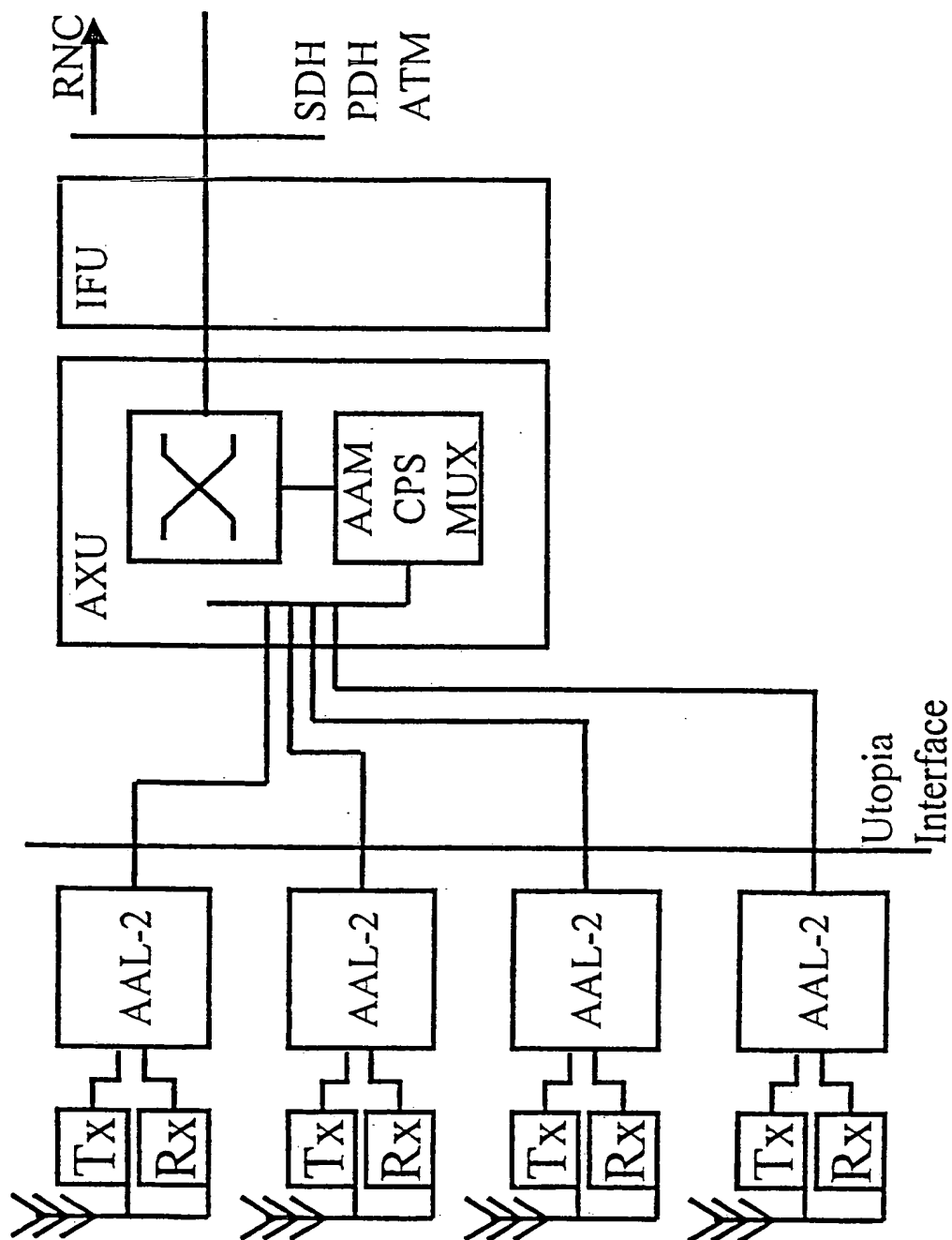


Fig. 3

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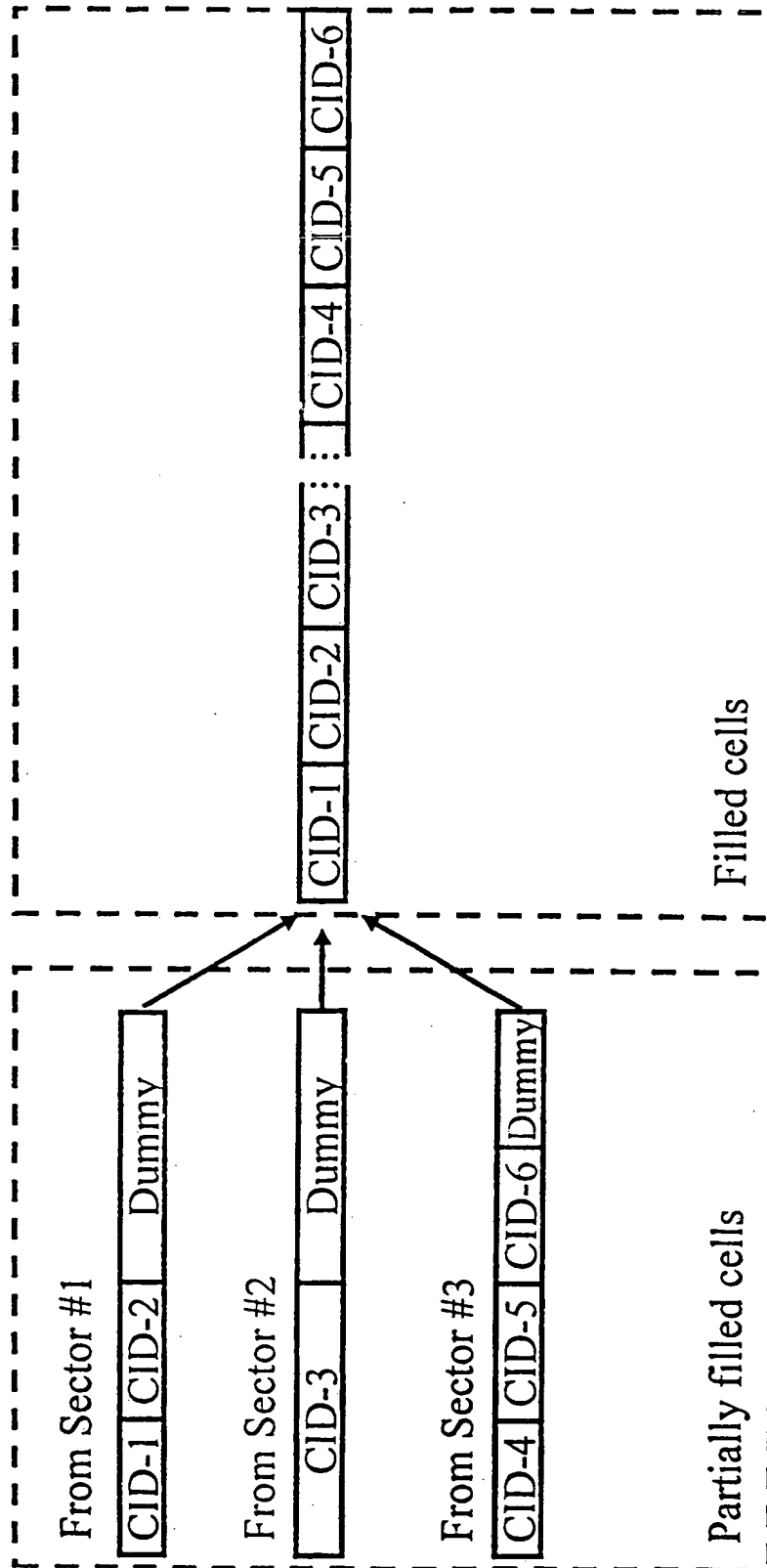


Fig.4

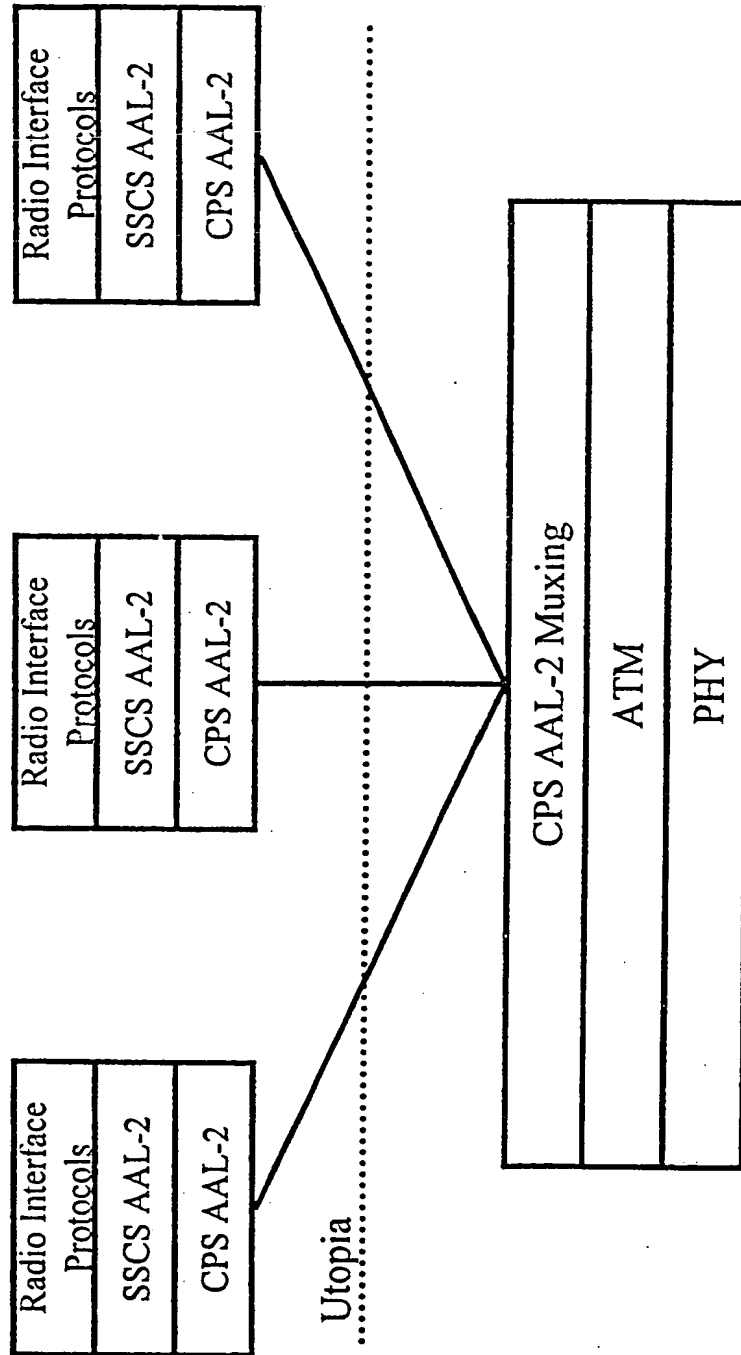


Fig. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BOLDT M ET AL: "Modeling an ATM-based access network for 3rd generation mobile communication networks" VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4 * sections I-IV *	1,6,7
Y	GB 2 322 515 A (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26) page 7, line 8 - line 9 page 8, line 1 - line 3 -/-	1,6,7

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

4 May 2000

Date of mailing of the international search report

18/05/2000

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>BYUNG-HAN RYU ET AL: "Performance evaluation for low bit-rate voice traffic in IMT-2000 network"</p> <p>PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954</p> <p>1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6</p> <p>* sections I-IV *</p>	1-7
A	<p>EP 0 915 634 A (LUCENT TECHNOLOGIES INC)</p> <p>12 May 1999 (1999-05-12)</p> <p>figure 1</p> <p>column 6, line 39 - line 49</p> <p>column 8, line 39 - line 54</p>	1,6,7

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/EP 99/07210

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2322515 A	26-08-1998	EP 0962117 A WO 9837728 A	08-12-1999 27-08-1998
EP 0915634 A	12-05-1999	JP 11225150 A	17-08-1999

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Rechtsanwälte

Erik Schäfer
Ulrike Alice Ulrich

Düsseldorf December 06, 2001

Your ref.

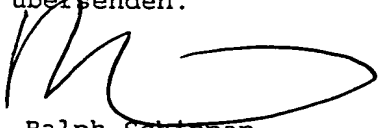
Our ref. SC/ar 000242WO et al.

Internationale Patentnameldung PCT/EP00/04496 et al.
Anmelderin: Nokia Networks Oy

Die Anmelderin hat mit Wirkung vom 01. Oktober 2001 ihren Namen geändert in:

Nokia Corporation.

Es wird gebeten, die Namensänderung für alle in der Anlage genannten
PCT-Anmeldungen **schnellstmöglich** vorzunehmen und die Formblätter PCT/IB/306
zu übersenden.


Dr. Ralph Schippan
Patentanwalt (24)

Anlage
Liste der umzuschreibenden PCT-Anmeldungen

Liste der auf die Nokia Corporation umzuschreibenden PCT-Anmeldungen

06.12.2001

Unser Zeichen	Anmelder	Amtliches Aktenzeichen
000242WO	NOKIA NETWORKS OY	PCT/EP00/04496
000388WO	NOKIA NETWORKS OY	PCT/EP00/03635
000474WO	NOKIA NETWORKS OY	PCT/EP00/09264
000475WO	NOKIA NETWORKS OY	PCT/EP00/09799
000476WO	NOKIA NETWORKS OY	PCT/EP00/10238
000532WO	NOKIA NETWORKS OY	PCT/EP00/06542
000544WO	NOKIA NETWORKS OY	PCT/EP00/09309
000579WO	NOKIA NETWORKS OY	PCT/EP00/08583
001029WO	NOKIA NETWORKS OY	PCT/EP01/03234
001037WO	NOKIA NETWORKS OY	PCT/EP00/13320
001081WO	NOKIA NETWORKS OY	PCT/EP00/11175
001093WO	NOKIA NETWORKS OY	PCT/EP00/11449
001094WO	NOKIA NETWORKS OY	PCT/EP00/12269
001127WO	NOKIA NETWORKS OY	PCT/EP01/00374
001128WO	NOKIA NETWORKS OY	PCT/EP01/00373
001129WO	NOKIA NETWORKS OY	PCT/EP01/00380
001170WO	NOKIA NETWORKS OY	PCT/EP00/13256
001270WO	NOKIA NETWORKS OY	PCT/EP00/13319
001276WO	NOKIA NETWORKS OY	PCT/EP01/02834
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990730WO	NOKIA NETWORKS OY	PCT/EP99/07210
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990756WO	NOKIA NETWORKS OY	PCT/EP99/10271
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VORAB PER TELEFAX

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Dipl.-Ing. Alexandra Weyres
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Rechtsanwälte

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Ulrike Alice Ulrich

Düsseldorf 02. November 2001

Ihr Zeichen

Unser Zeichen SC/WY/ar 990730WO

Durchwahl +49(0)211-90 49 033

International Patent Application PCT/EP99/07210
Nokia Networks Oy

To the Written Opinion (PCT Rule 66) dated August 03, 2001

It is respectfully requested that the application is further examined under consideration of the following comments to the Written Opinion. The claims of the application are maintained without amendments.

I. Pending claims

The invention relates to a telecommunication network using the W-CDMA protocol (independent claim 1), to an ATM switch for such a network (independent claim 6), and to a method for data processing in such a network (independent claim 7). In terms of the claimed telecommunication network of claim 1, the invention comprises the following features:

- A The network comprises a variety of base stations.
- B The base stations communicate with each other via a central RNC by an ATM based data connection via an I_{ub} interface.
- C At least one of the base stations comprises a variety of radio sectors with physically distributed AAL-2 based termination points.
- D Each termination point has a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time.
- E All AAL cell streams are sent parallel to each other to an ATM switching unit via an UTOPIA interface.
- F The ATM switching unit comprises a multiplexing unit for multiplexing AAL-2 connections of the different termination points into one single ATM virtual connection to be processed by the ATM switch.

These features enable an increase of the efficiency of a telecommunication network. More specifically, the ATM cells of the ATM virtual connections between base station and RNC are filled to a greater extend without having to increase the maximum delay time required for transmitting ATM cells.

II. State of the art

In the Written Opinion, four documents are cited:

- D1: Boldt M. et al.: "Modeling an ATM-based access network for 3rd generation mobile communication networks";
- D2: GB-A-2 322 515;
- D3: Byung-Han Ryu et al.: "Performance evaluation for low bit-rate voice traffic in IMT-2000 network"; and
- D4: EP 0 915 634 A.

Boldt M. et al. (D1)

In document D1, a simulation model of an ATM-based access network for 3G mobile communication systems is proposed. In particular, models of the components of an access network are presented. (abstract) It is stated to be a problem in ATM that when the offered payload is smaller than the payload of an ATM cell, the cells will either be only partially filled or delayed. A solution to this problem is supposed to be AAL2, according to which air interface frames are mapped first to minicells, which minicells are then multiplexed to ATM cells. (p. 2590, col.2, first and second paragraph)

Figure 6 of document D1 shows an architecture of an access network that can be employed for AAL2. In this architecture, several base stations are connected to a respective RNC. The datastreams received by a base station can be terminated either in an intermediate unit IU in the respective base station or in a common IU in an RNC to which several base stations are connected. (p. 2592, col. 1, last paragraph - col. 2, first paragraph) The IUs may take care of mapping the air interface frames to minicells which are then multiplexed into ATM cells (p. 2591, col.2, paragraph 1 and fig. 2). A transport relay TR in the RNC further includes switching functions.

GB-A-2 322 515 (D2)

Document D2 describes an adaptation layer switching network which is able to assemble AAL2 minicells into ATM cell format (abstract). It is mentioned that several users can be multiplexed in a single ATM connection, where each user's information is carried in minicells (page 4, line 31 to page 5, line 6).

Byung-Han Ryu et al. (D3)

Document D3 relates to communication network using CDMA and ATM, and more specifically to the ITM-2000 network proposed at the ITU-T (p. 238, col.1, paragraph 2). It presents the system performance regarding the transmission of user data from a BTS to a BSC (abstract). As starting point, it is assumed that for the transmission of voice traffic, the voice traffic is first constructed as AAL2 structure at the LIU in the BTS and then multiplexed on ATM cell payload (p. 238, paragraph connecting columns 1 and 2). The AAL2 structures are to be understood as minicells (p. 238, col. 2, paragraph 2).

EP 0 915 634 A (D4)

This document relates to a method for call admission in an AAL2/SSCS packet voice system (Abstract).

III. Novelty and inventive step

Claim 1

The Examiner considered claim 1 not to be inventive over document D1, a combination of documents D1 and D2, or a combination of documents D3 and D2.

Of the cited references, document D1 can be considered to be the closest prior art for the application, since it basically discloses features A, B, D and E of the invention. It is to be noted, though, that W-CDMA and the employed interfaces are not mentioned.

Document D1 does not disclose the possibility of using base stations comprising a variety of radio sectors with physically distributed AAL-2 based termination points. In addition, document D1 does not include the possibility of multiplexing parallel AAL2 connections to a single ATM connection in a switching unit of a base station. Thus, features C and F are not known from document D1.

Therefore, the subject matter of claim 1 is new over document D1. It moreover implies an inventive step.

Proceeding from document D1, it is a problem that the proposed network does not work with maximum efficiency in case base stations with physically distributed termination points are employed. More specifically, each of these termination points multiplexes different call IDs in its sector to one ATM virtual connection. The multiplexed AAL 2 datastreams have to be taken care of in an efficient manner for further transmission.

The problem is solved according to claim 1 for a network with sectorised base stations (feature C) by introducing feature F, i.e. by a multiplexing unit in the ATM switching unit of a base station which multiplexes AAL 2 connections of the different termination points into a single ATM virtual connection to be processed by the ATM switch of the base station.

A person skilled in the art would not even consider document D1 when looking for a solution to the problem, since it does not relate to a network with base stations comprising several termination points. The base stations of a network according to document D1 thus do not have to deal with several multiplexed AAL2 data streams present at the base station so that a solution to the problem cannot be expected to be found here.

But even if a person skilled in the art would consider the teachings of D2, he would not find any hint to include the proposed additional multiplexing unit in an ATM switching unit of the base station.

The object mentioned in document D1 is in general terms the same as in the invention, i.e. transmitting better filled ATM cells with little delay. However, document D1 proceeds from a network in which an entire ATM cell is employed for each payload. The solution proposed in D1 constitutes only the first part of the invention, i.e. the provision of an AAL2 connection by each termination point, which only corresponding to feature D of claim 1. No approach is proposed which goes further than multiplexing minicells to ATM cells, i.e. there is no suggestion to multiplex several AAL2 connections comprising already multiplexed minicells to a single virtual connection.

The invention is suited for resolving the conflict between filled ATM cells and short delay times to a greater extent than document D1 for the special case that a base station has several radio sectors. That is, the datastreams provided by several termination points of one base station are to be transmitted more efficiently between this base station and an RNC.

Document D1 includes the possibility of multiplexing minicells of different base stations to a single AAL2 connection. But this is achieved by locating the IU as termination point in the RNC for several base stations, thus no ATM connections are provided between base stations and the RNC. Again, only data of a single termination point is multiplexed to an AAL2 connection.

In contrast to the opinion expressed by the Examiner, the location of the multiplexing unit of feature F is moreover of particular importance. The multiplexing unit in feature F is able to combine Call IDs coming from different sectors of one base station into the same virtual connection. This means that the data streams received from the physically distributed termination points, which were already multiplexed to AAL2 datastreams, are multiplexed again, before they leave the base station. Only then, they enter

the transport network in an ATM connection. It is important that already these connections are used efficiently, e.g. since the ATM connections may be rather expensive.

Thus, no solution is presented in document D1 for providing user data originating from several termination points as ATM virtual connection from a single base station more efficiently to an RNC.

Also document D2 does not provide a person skilled in the art with additional information which would suggest the solution according to claim 1.

It is not claimed to be new or inventive to multiplex the data of several users in a single ATM connection, which is mentioned in document D2. This is rather described as known for the users served by a single radio section of a base station. But also in document D2, there is no hint at the possibility of using base stations comprising a variety of radio sectors with physically distributed AAL-2 based termination points. Accordingly, there is no indication how the transmission of data provided by several termination points of a single base station to the RNC to which it is connected can be made more efficient. The paragraph of document D2 cited by the Examiner does not even disclose for another location in a communications network the possibility of multiplexing provided multiplexed AAL2 cell streams to a single ATM virtual connection. Further, the importance of locating the second multiplexing into the base station, which was already mentioned above, has to be pointed out again. Thus, features C and F of claim 1 are also missing in this document, and there is no hint at a corresponding proceeding.

The difference between documents D1 and D2 on the one hand and the invention on the other hand can also be seen quite clearly in figure 4 of the application. In the cell diagram of this figure, it is shown on the left hand side that the data of several users located in one radio section is multiplexed at one termination point in a single AAL2 connection as known from the cited references. This corresponds to feature D of claim 1. It can be seen that the ATM cells resulting in this multiplexing are only partially filled. The AAL2 connections provided by different termination points (feature C) of a base station are then multiplexed additionally by the switching unit to a single ATM connection (feature F). Such a second multiplexing is not disclosed or suggested in the cited references.

Therefore, the subject matter of claim 1 is neither known nor obvious with the disclosure of document D1 nor by a combination of D1 and D2.

The Examiner cited in addition document D3 as alternative to document D1.

As in document D1, it is not mentioned in document D3 that a single base station may have several radio sectors with dedicated termination points, nor that a multiplexing of AAL2 connections which include already data of several users, i.e. of those users located in the same radio sector, is possible. Moreover, in document D3 the ATM connection is to be established between base station and BSC, not RNC. Document D3 does therefore not disclose more features of the invention than document D1.

Document D4, which was not referred to by the Examiner for novelty or inventiveness, does not comprise any additional suggestions leading a person skilled in the art to the network of claim 1 either.

In the whole, it becomes clear that also in view of the cited prior art, the subject matter of claim 1 is new and based on an inventive step.

Claims 6 and 7

The features of independent claims 6 and 7 correspond to the features of independent claim 1 so that the same comments apply to them.

Thus, also claims 6 and 7 of the invention are new and inventive.

Dependent claims

Claims 2 to 5 depend on independent claim 1 and are thus grantable with grantable independent claim 1.

IV. Further remarks

The formal objections by the Examiner will be taken care of in the respective national phase of the application.

Based on the above explanations, it is expected that it will be possible now to issue a preliminary international examination report which is positive

with regard to novelty, inventive step and industrial applicability of the application.

A handwritten signature in black ink, consisting of a stylized 'R' followed by a large, sweeping loop.

Dr. Ralph Schippan
Patent Attorney (24)

EPA / EPO / OEB D - 80298 München

COHAUSZ & FLORACK
Patent- und Rechtsanwälte
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Nr. der Anmeldung / Application No. / Demande de brevet n°

PCT/EP 99 / 07210

Tag des Eingangs / Date of Receipt / Date de réception

29.09.99

Zeichen des Anmelders / Vertreter - Applicant / Representative
Ref. No. - Référence du demandeur ou du mandataire

SC/ar 990730W0

Anmelder: Nokia Telecommunications Datum / Date 28.09.1999
Applicant: oy
Demandeur :

Empfangsbescheinigung / Receipt for documents / Récépissé de documents

Das Europäische Patentamt bescheinigt hiermit den Empfang folgender Dokumente :

The European Patent Office hereby acknowledges the receipt of the following :

L'Office européen des brevets accuse réception des documents indiqués ci-dessous :

**A. Anmeldeunterlagen / items making up
the application / pièces de la demande**

**Stückzahl / No. of copies /
Nombre d'exemplaires**

☒ Antrag
Request
Requête

1

☒ Beschreibung
Description

3

☒ Patentanspruch (Patentansprüche)
Claim(s)
Revendication(s)

3

☐ Ggf. unterschiedliche Patentansprüche
Different claims
Le cas échéant, revendications différentes

—

☒ Zeichnung(en)
Drawing(s)
Dessin(s)

3

☒ Zusammenfassung
Abstract
Abrégé

3

☐ Prioritätsbeleg(e)
Priority document(s)
Document(s) de priorité

—

☐ Übersetzung des(r) Prioritätsbelegs(belege)
Translation of priority document(s)
Traduction du ou des documents(s) de priorité

—

**B. Beigefügte Dokumente / accompanying
documents / documents joints**

☐ Vertretervollmacht
Authorisation of representative(s)
Pouvoir de mandataire

☐ Erfindernennung
Designation of Inventor
Désignation de l'inventeur

☐ Früherer Recherchenbericht
Earlier Search report
Rapport de recherche antérieure

☒ Gebührenberechnungsblatt
Fee calculation sheet
Feuille de calcul des taxes

☒ Abbuchungsauftrag
Debit order Betrag/Currency/Monnaie
Ordre de débit Betrag/Amount/Montant

2.410,-- €

☐ Scheck
Cheque Ausfüllung freigestellt/
Chèque optional/facultatif

☐ Sonstige Unterlagen
Other documents
Autres documents

Die genannten Unterlagen sind am oben genannten Tag eingegangen; die Anmeldung hat die ebenfalls oben angeführte
Anmeldenummer erhalten / The said items were received on the date indicated above and the application has been assigned the
above-indicated application number / Les documents mentionnés ont été reçus à la date indiquée; le numéro figurant ci-dessus a été
attribué à la demande de brevet



PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) SC/ar 990730W0

Box No. I	TITLE OF INVENTION		TELECOMMUNICATION NETWORK	
Box No. II	APPLICANT			
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)		<input type="checkbox"/> This person is also inventor.		
Nokia Telecommunications Oy Keilalahdentie 4		Telephone No.		
FI - 02150 Espoo		Facsimile No.		
Finland		Teleprinter No.		
State (that is, country) of nationality: FI		State (that is, country) of residence: FI		
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box				
Box No. III	FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)			
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BRUNDERT, Martin		<input type="checkbox"/> applicant only		
Orsoyer Str. 23		<input checked="" type="checkbox"/> applicant and inventor		
D - 40474 Düsseldorf		<input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)		
Germany				
State (that is, country) of nationality: DE		State (that is, country) of residence: DE		
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<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.				
Box No. IV	AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE			
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:		<input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative		
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Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CAPITAN CUADRADO, Faustino
Westtangente 15

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Germany

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

ES

State (that is, country) of residence:

DE

This person is applicant for the purposes of:

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SOLANA DE QUESADA, Juan Ignacio
Lohgerberstr. 10
D - 40878 Ratingen
Germany

This person is:

- ☐ applicant only
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State (that is, country) of nationality:

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This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

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This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

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This person is applicant for the purposes of:

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Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

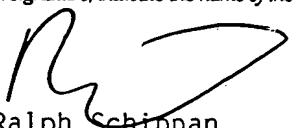
Regional Patent

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Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): _____				
<i>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</i>				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) <i>(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</i>		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office)		
ISA /				
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 8 claims : 3 abstract : 1 drawings : 5 sequence listing part of description : _____ Total number of sheets : 21		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
Figure of the drawings which should accompany the abstract: fig. 3		Language of filing of the international application: English		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
<i>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</i>				
 Dr. Ralph Schippan Patent Attorney (24)				

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1. Date of actual receipt of the purported international application: _____ 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: _____ 4. Date of timely receipt of the required corrections under PCT Article 11(2): _____ 5. International Searching Authority (if two or more are competent): ISA /	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

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Date of receipt of the record copy by the International Bureau: _____

PCT

FEE CALCULATION SHEET Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's
file reference

SC/ar 990730W0

Applicant

Nokia Telecommunications Oy

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE EUR 102,-- T

2. SEARCH FEE EUR 945,-- S

International search to be carried out by

(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 21 sheets.

first 30 sheets EUR 413,-- b1

x = b2

remaining sheets additional amount

Add amounts entered at b1 and b2 and enter total at B EUR 413,-- B

Designation Fees

The international application contains 81 designations.

10 x 95,-- = EUR 950,-- D

number of designation fees payable (maximum 10) amount of designation fee

Add amounts entered at B and D and enter total at I EUR 1,363,-- I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) P

5. TOTAL FEES PAYABLE EUR 2,410,--

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☒ authorization to charge
deposit account (see below)

☐ cheque

☐ postal money order

☐ bank draft

☐ cash

☐ revenue stamps

☐ coupons

☐ other (specify):

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ EP0 ☒ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

28000261

28.09.1999

Dr. Schippan, Patent Attorney (24)

Deposit Account No.

Date (day/month/year)

Signature

SC/ar 990730WO
September 28, 1999

CLAIMS

1. Telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface,

characterized in, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

2. Telecommunication network according to claim 1, characterized in, that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers.

3. Telecommunication network according to claim 1 or 2, **characterized in**, that each of the channels of the sectors have different bandwidths.

4. Telecommunication network according to one of the proceedings claims, **characterized in**, that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

5. Telecommunication network according to claim 4, **characterized in**, that the multiplexing unit (AAM CPS MUX) is of plug-in type.

6. ATM switch for a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, **characterized in**, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

7. Method for data processing in a telecommunication network using the W-CDMA protocol, the network consisting of a variety of basis stations communicating with a central radio network controller via an I_{UB} interface in which the data connection between the base stations and the RNC controller uses ATM based broadband data traffic, whereby at least one of the base stations generates AAL over ATM data streams corresponding to the termination points of different radio sectors within one cell (base station), the different call ID's within the same sector being mapped into AAL-2 over ATM streams with a given delay time under control of a control unit timer, and whereby all ATM cell streams of the different sectors of one base unit are sent in parallel to an ATM switching unit via an UTOPIA interface, characterized in, that parallel incoming AAL-2 connections of the different termination points of one base station are multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

SC/ar 990730WO
September 28, 1999

Telecommunication network

The present invention concerns telecommunication network using the W-CDMA protocol comprising a variety of base stations communicating with each other via a central Radio Network Controller by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations is comprising a variety of radio sectors with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections under the control of a control unit timer with a given delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit via an UTOPIA interface.

Moreover, the invention concerns an ATM (= Asynchronous Transfer Mode) switch for a telecommunication network mentioned above as well as a method for processing data within a telecommunication network mentioned above.

The principal structure of a telecommunication network using the W-CDMA (Wideband-Code Division Multiple Access) protocol is known from practical knowledge. The structure and function of networks of that kind is known from ITU-T Recommendation I.362.2. Networks of this kind play on important role in the so called „Third Generation“ telecommunication networks.

These kinds of networks use the AAL-2 (= ATM Adaptation Layer) over ATM standards as the protocols for broadband transmission. There are usually a variety of different base stations within the W-CDMA network each of which defining a cell. A cell, especially a cell covering an area with dense traffic can be divided into a number of sectors. Each of the sectors contains its own termination point for the AAL over ATM data. To each call in a given sector of a base station a call identification (call ID, CID) is allocated and a number of calls within a given sector is mapped into a single ATM virtual connection under use of the call ID.

The multiplexing/mapping of the different calls into one single ATM virtual connection at the respective termination point is governed by a control unit. The control unit comprises a control unit timer (CU timer) which supervises the mapping of the calls into the ATM cell which has a given length (53 bits, were 48 bits are reserved for the payload). Each ATM cell is filled with the data coming from different calls within a given sector until the ATM cell is full or the allowed CU timer limit is achieved which means that the given CU time is expired. The reason for the timer is to guarantee a maximum delay in the process of filling up the ATM cells in case if there are not enough data from the calls to be transmitted. This means, if the CU timer time expires, when the ATM cell is not yet filled, the ATM cell is transmitted only partially filled which results in a reduced efficiency.

This means, that a small value of the CU timer has the advantage that only small delay in the process of filling up the ATM cells is achieved but, that the probability of generating only partially filled cells is increased.

On the other hand, if the CU timer is set to a larger value, the probability of generating only partially filled cells is reduced but this does not guarantee the required maximum delay time. In an extrapolation, if the time delay of the CU timer would be infinite, the probability of filling all cells is 100 percent, which would result in the best efficiency of the ATM network.

An other problem raising is that the amount of simultaneous calls that a single sector of a base station has to handle may not be enough to make the usage of the ATM bandwidth effective enough. Theoretical valuations have shown that the use of AAL-2 over ATM technology is only efficient if the number of CIDs in a single ATM virtual connection is at least 50.

It is therefore the object of the present invention to increase the efficiency of the telecommunication network without a drop of the required maximum delay time.

This object is achieved in a system mentioned above by the ATM switching unit comprising a multiplexing unit for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

Accordingly, this object is achieved by a method for operating a network mentioned above by the parallel incoming ALL-2 connections of different termination points of one base station being multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

It is the central idea of the present invention to propose a system and a method to increase the bandwidth

usage efficiency by combining the parallel data traffic coming from different sectors of one base station before it is processed by the ATM switch. The incoming parallel data streams from the physically distributed termination points at the AAL-2 layer are multiplexed at a centralized location which leads to a very high efficiency because now - also for non-infinite delay times - the ATM virtual connections are processed with a very high occupancy rate. Nevertheless, the different sectors of the base station are still able to generate AAL-2 cells and transfer them to the multiplexing unit by using the standard UTOPIA interface. For all parallel data paths parts before the multiplexer, the CU time for mapping the AAL cells can be selected small so that low delay is guaranteed. Accordingly, at this part of the network the probability for partially filled cells is still large and a number of CID values used by the different BS sectors can still be small. After the multiplexing step, however, the number of CIDs used in the single ATM virtual connection is now significantly larger because the data stream combines all calls coming from different sectors of the base station. This means that the „dummy information“ which was contained in the AAL cells at the UTOPIA interface before the multiplexing operation is removed by which the efficiency of the whole system is remarkably enhanced.

A preferred embodiment of the system is characterized in that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers. Due to the independent CU-timers a bound in the delay across the AAL-2 layer entities is guaranteed.

A further improvement of the described system may foresee that the CU timer used in the AAL-2 multiplexing unit has a larger value than the CU time of the parallel data streams before the multiplexing unit. By this, the probability of occupancy of the ATM cells is further increased which means that the efficiency of the bandwidth usage is further increased.

Further advantages are related to the subclaims.

It is emphasized that because of the fact that the system mentioned above is based on variable bit rated data processing, the bandwidth of each channel corresponding to a respective termination point of the base station may vary notwithstanding the fact that the system is still capable of processing the data as described above.

The invention is now illustrated by means of an embodiment as depicted in the drawings.

Fig. 1 shows a general set up of a telecommunication network according to the prior art

Fig. 2 shows a detail of Fig. 1 directed to the data processing between the base station and the radio network controller RNC

Fig. 3 shows a modification of the ATM switch unit of Fig. 2 according to the embodiment of the present invention

Fig. 4 illustrates the functional principles of the present invention by means of a cell diagram

and

Fig. 5 shows the protocol stack for the multiplexing unit according to the present invention.

As can be seen from Fig. 1, in a conventional telecommunication network different base stations BS are comprised each of which defining a cell (depicted by a circle). The base stations are communicating with a central radio network controller RNC via a broadband data connection using an I_{UB} interface. Within a given cell, the identification and information of a call of a given mobile station MS is received via the antenna of a given base station, processed through a receiver in which the data are digitalized and transmitted to a termination point. From the termination point the data are transmitted to the Radio Network Controller RNC via the AAL-2 over ATM standard technology.

As also shown in Fig. 1, each cell is divided in different sectors, where as each sector has its own termination point. The division of a cell in a variety of sections is preferred for those cells which have a lot of traffic.

The data processing for a base station with a variety of sectors is shown in Fig. 2.

The calls received in the different sectors are digitalized and processed by separate units each of which having separate termination points. It is clear that the termination points are usually physically distributed, i.e. that they are located in different areas. Their distance may vary between a few centimetres up to hundreds of meters.

Each of the data streams leaving the termination points of the different sectors of one base station are processed in parallel and are sent to an ATM switch AXU where they are processed to the I_{UB} interface communicating with the central radio network controller RNC. The data traffic between the different termination points and the ATM switch uses a known so-called „UTOPIA“ interface.

Fig. 3 shows a block diagram of a network according to the present invention. This embodiment refers to a „Third Generation“ Telecommunication Network. Generally, it corresponds to the system as described related with Fig. 2. In contrast to that, however, between each of the parallel outgoing data lines coming from the different termination points of the base station on one hand and the ATM switch AXU on the other hand, a multiplexing unit AAM CPS MUX is comprised. In this unit the different cells coming from different base station sectors are combined into the same virtual channel of an ATM cell arriving at the ATM switch.

This process is shown in Fig. 4.

The calls received in sector 1 of a given base station are named e.g. CID-1 and CID-2 and are mapped in the AAL-2 over ATM cell coming from the termination point of sector 1. It is shown that because of the fixed length of an ATM cell some space is left free „DUMMY“ which means that an only partially filled cell is transmitted from sector 1. Accordingly, from sector 2 only one call-ID (CID-3) is transmitted which means that even more of the ATM cell is transmitted unfilled. The same refers to the calls coming from sector 3 as also shown in Fig. 4.

After the multiplexing process in unit AAM CPS MUX, ATM cells are transmitted which are completely filled because the space available in a given cell is filled with the remaining payload originating from another cell coming from a different radio sector. For example as shown in fig. 4, the first cell coming from sector 1 is filled up with the data coming from sector 2 (CID-3) until the first cell is filled and the rest of the information of CID-3 is mapped into the second ATM cell after which the rest of this second cell is filled with the traffic coming from sector 3. Therefore, the number of CID's used in a single ATM VCC is now significantly larger because it combines calls coming from different base stations sectors. Moreover, the dummy information contained before in the AAL-2 cells at the UTOPIA interface between the BS sectors and the multiplexing unit is removed.

Even if the time delay used for the coding of the AAL cells within the base station sectors is kept small in order to allow a low maximum delay, the occupancy rate of the ATM cell processed to the ATM switch, e.g. after multiplexing, is very high. By this the efficiency of the bandwidth usage of the system is significantly increased.

Fig. 5 shows the corresponding protocol stack for the multiplexing unit according to the present invention.

In the lower part of Fig. 5 the first three layers (PHY, ATM, CPS, AAL-2 Muxing) of the multiplexing unit are shown. These three layers are used by all instances of the upper layers, which are provided for each incoming data line individually.

The upper layers comprise the CPS AAL-2 layer and the SSC AAL-2 layer as well as radio interface protocol layers.

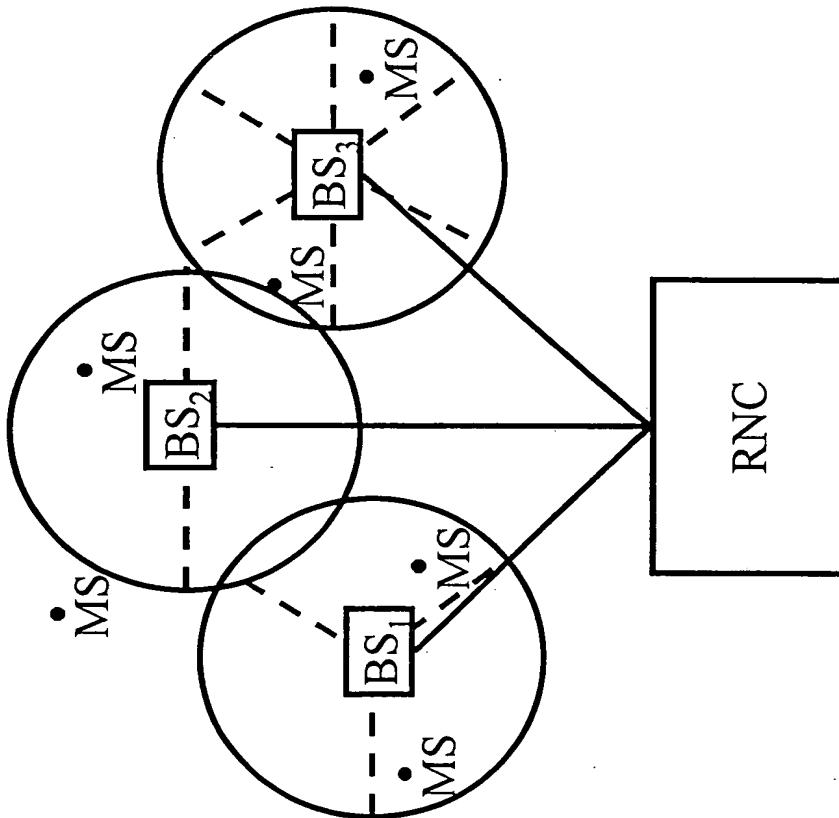


Fig. 1

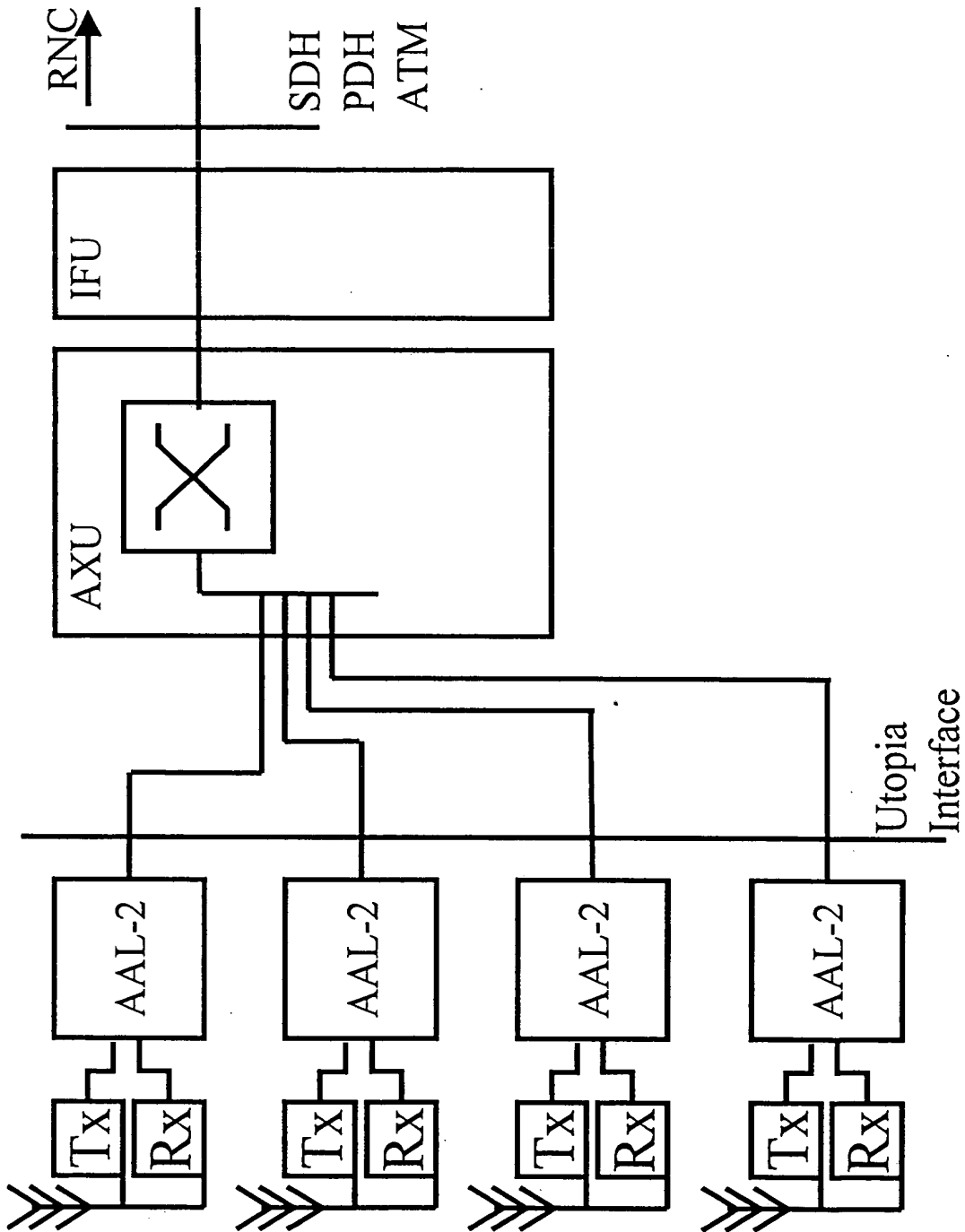


Fig. 2

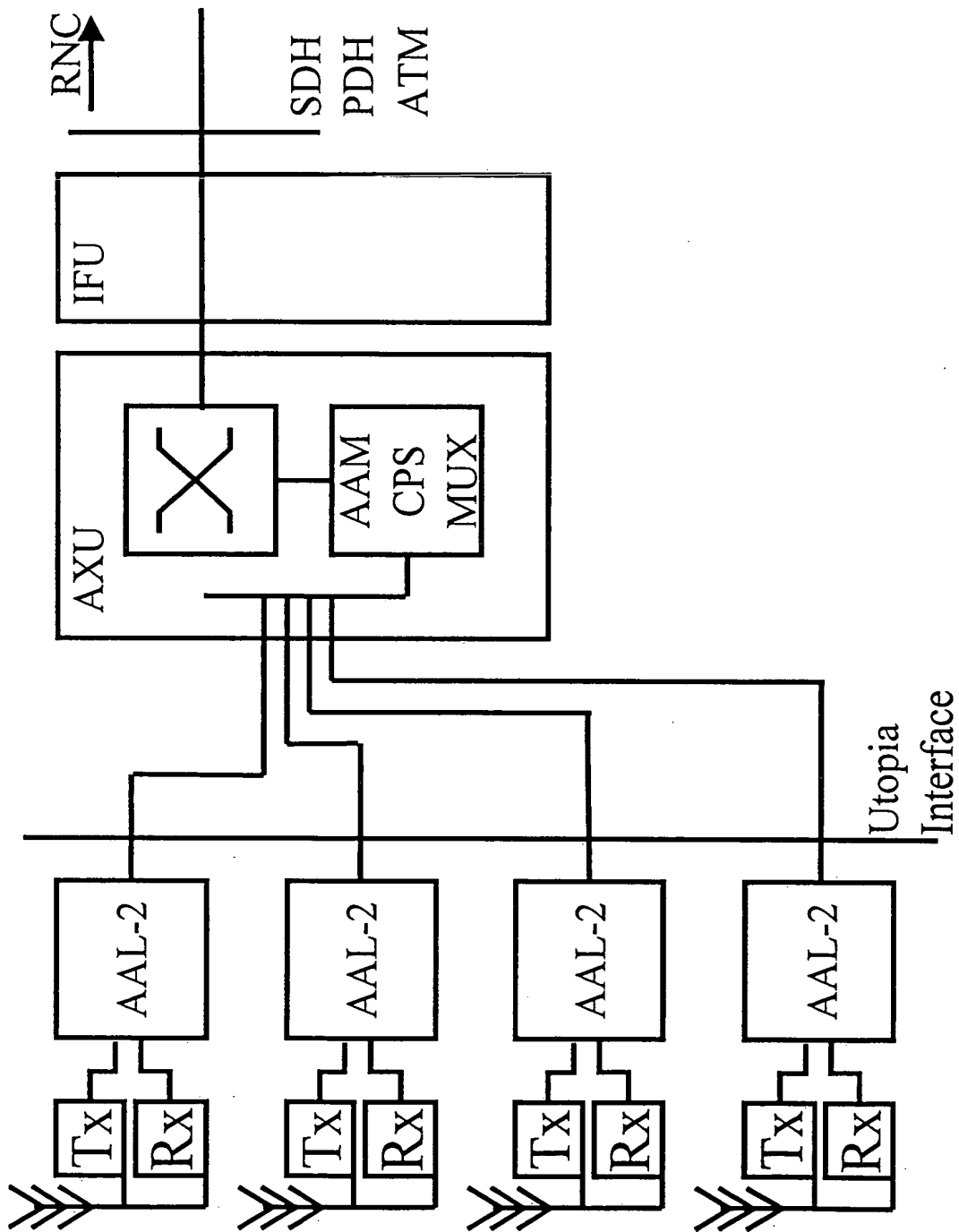


Fig. 3

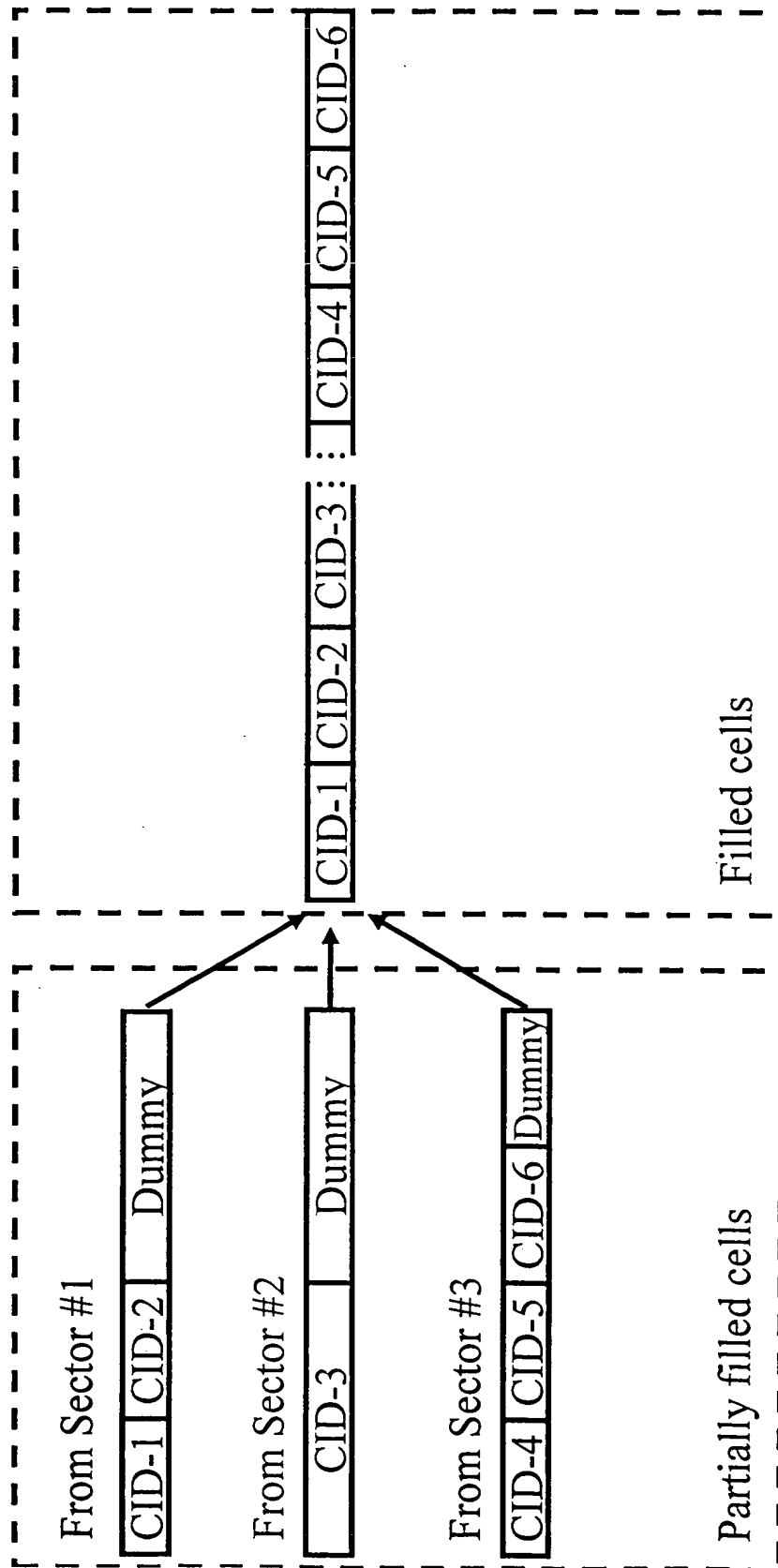


Fig.4

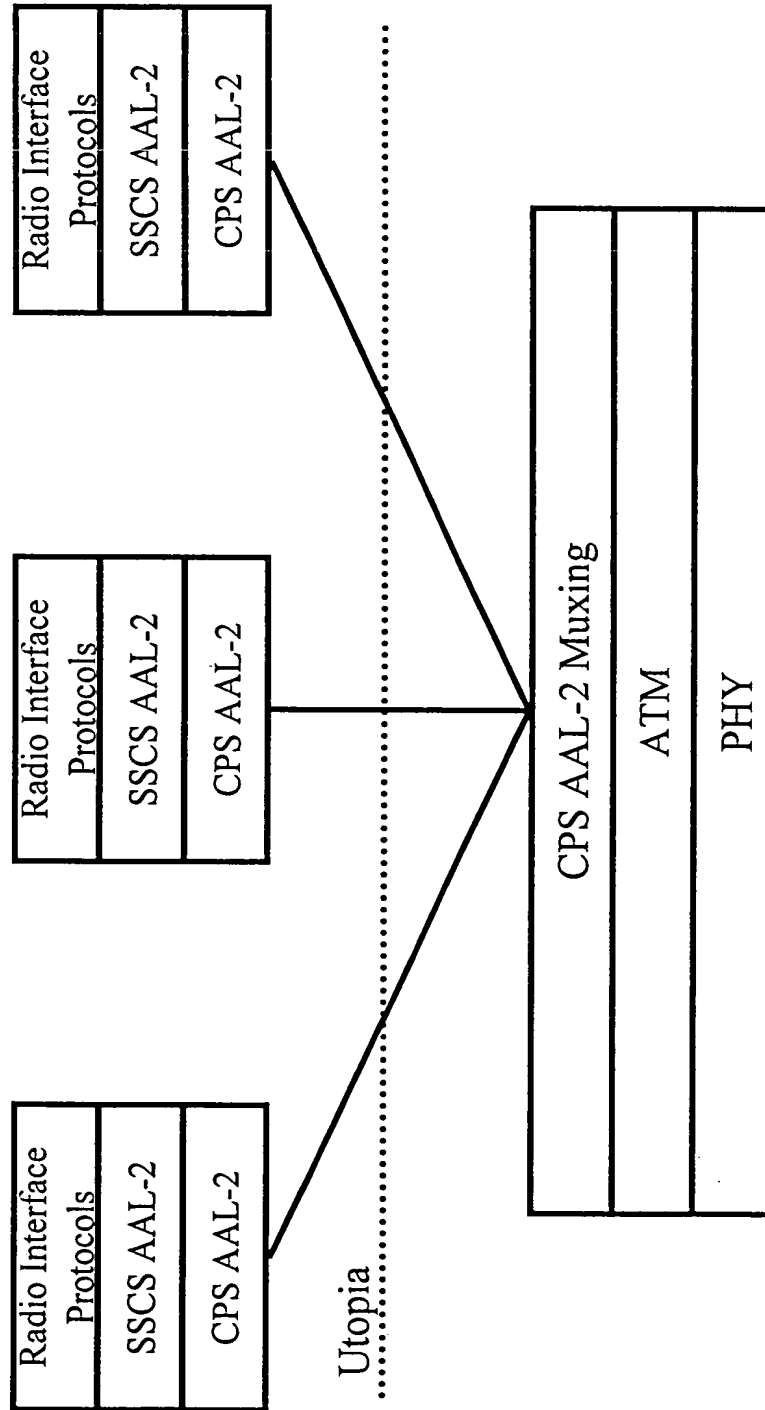


Fig. 5

SC/ar 990730WO
September 28, 1999

ABSTRACT

The invention concerns a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface. In order to increase the efficiency of the system without a reduction of the maximum allowed delay, the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

Figure 3 is provided for the publication.

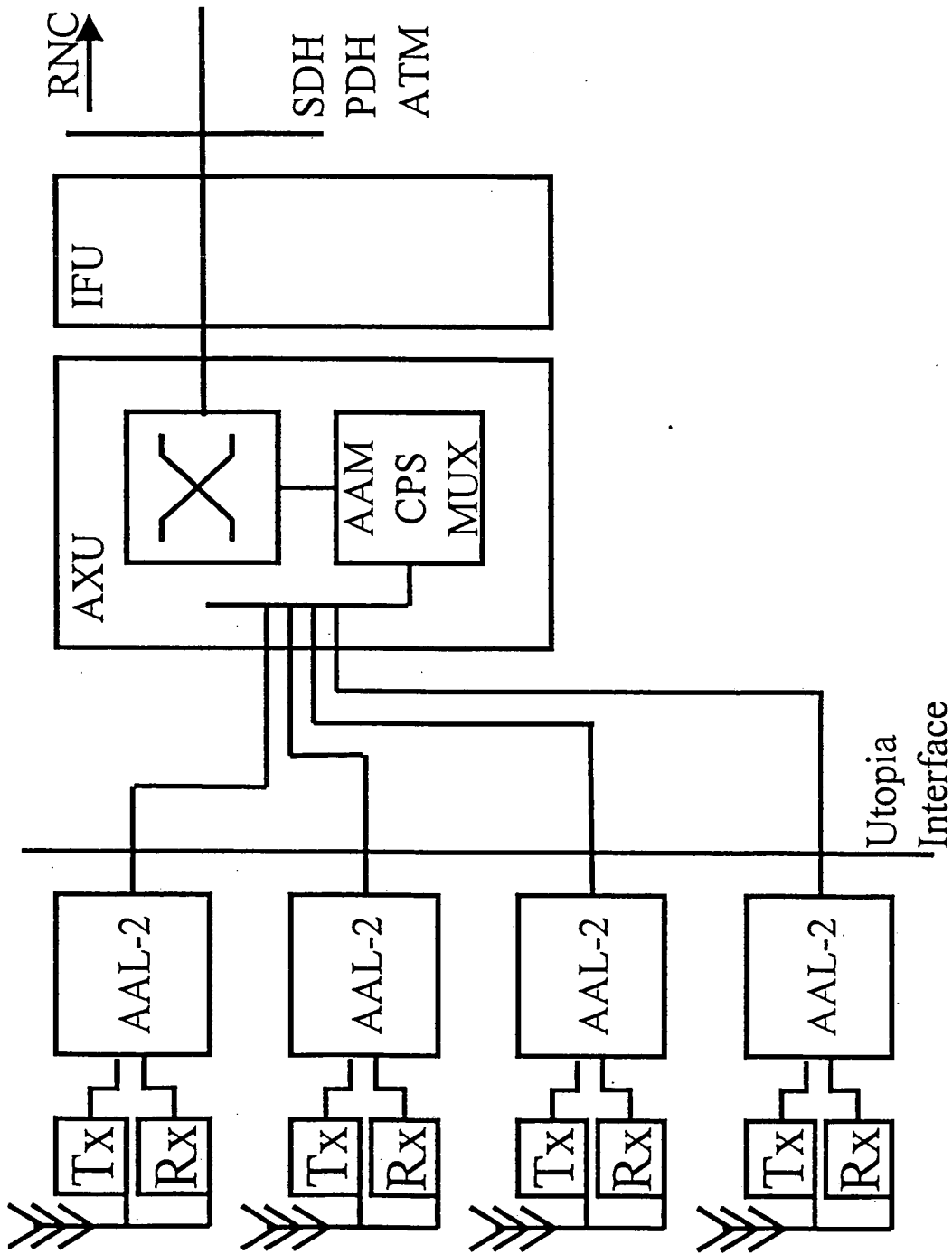


Fig. 3

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

COHAUSZ & FLORACK

Kanzlerstrasse 8a

D-40470 Düsseldorf

ALLEMAGNE

28. FEB. 2000

First file

Carbeller


50

12

Date of mailing (day/month/year) 10 February 2000 (10.02.00)
Applicant's or agent's file reference SC/ar 990730WO
International application No. PCT/EP99/07210

IMPORTANT NOTIFICATION
International filing date (day/month/year) 29 September 1999 (29.09.99)

1. The following indications appeared on record concerning:									
<input checked="" type="checkbox"/> the applicant	<input type="checkbox"/> the inventor								
<input type="checkbox"/> the agent	<input type="checkbox"/> the common representative								
Name and Address NOKIA TELECOMMUNICATIONS OY Keilalahdentie 4 FIN-02600 Espoo Finland	<table border="1"> <tr> <td>State of Nationality FI</td> <td>State of Residence FI</td> </tr> <tr> <td colspan="2">Telephone No.</td> </tr> <tr> <td colspan="2">Facsimile No.</td> </tr> <tr> <td colspan="2">Teleprinter No.</td> </tr> </table>	State of Nationality FI	State of Residence FI	Telephone No.		Facsimile No.		Teleprinter No.	
State of Nationality FI	State of Residence FI								
Telephone No.									
Facsimile No.									
Teleprinter No.									
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:									
<input type="checkbox"/> the person	<input checked="" type="checkbox"/> the name								
<input type="checkbox"/> the address	<input type="checkbox"/> the nationality								
<input type="checkbox"/> the residence									
Name and Address NOKIA NETWORKS OY Keilalahdentie 4 FIN-02600 Espoo Finland	<table border="1"> <tr> <td>State of Nationality FI</td> <td>State of Residence FI</td> </tr> <tr> <td colspan="2">Telephone No.</td> </tr> <tr> <td colspan="2">Facsimile No.</td> </tr> <tr> <td colspan="2">Teleprinter No.</td> </tr> </table>	State of Nationality FI	State of Residence FI	Telephone No.		Facsimile No.		Teleprinter No.	
State of Nationality FI	State of Residence FI								
Telephone No.									
Facsimile No.									
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3. Further observations, if necessary:									
4. A copy of this notification has been sent to:									
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned								
<input checked="" type="checkbox"/> the International Searching Authority	<input type="checkbox"/> the elected Offices concerned								
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Jean-Marie McAdams  Telephone No.: (41-22) 338.83.38
---	--

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

COHAUSZ & FLORACK
Kanzlerstrasse 8a
D-40470 Düsseldorf
ALLEMAGNE

17. APR. 2001

17. APR. 2001

Date of mailing (day/month/year)
05 April 2001 (05.04.01)

Applicant's or agent's file reference
SC/ar 990730WO

IMPORTANT NOTICE

International application No.
PCT/EP99/07210

International filing date (day/month/year)
29 September 1999 (29.09.99)

Priority date (day/month/year)

Applicant

NOKIA NETWORKS OY et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,
GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,
NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 05 April 2001 (05.04.01) under No. WO 01/24570

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

J. Zahra

Facsimile No. (41-22) 740.14.35

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

COHAUSZ & FLORACK
Kanzlerstrasse 8a
D-40472 Düsseldorf
ALLEMAGNE

Eingang:	12. FEB. 2002		
Für:			
Bearbeiter:	SC	HL	

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year) 08.02.2002

Applicant's or agent's file reference

SC/wa 990730WO

IMPORTANT NOTIFICATION

International application No.
PCT/EP99/07210

International filing date (day/month/year)
29/09/1999

Priority date (day/month/year)
29/09/1999

Applicant

NOKIA NETWORKS OY et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Finnie, A

Tel. +49 89 2399-8251



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference SC/wa 990730WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/07210	International filing date (day/month/year) 29/09/1999	Priority date (day/month/year) 29/09/1999
International Patent Classification (IPC) or national classification and IPC H04Q11/04		
Applicant NOKIA NETWORKS OY et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 07/03/2001	Date of completion of this report 08.02.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hodgins, W Telephone No. +49 89 2399 8987 <div style="text-align: right;">  </div>

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/07210

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-7 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/07210

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-7
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-7
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations
see separate sheet

Concerning Point V

- 1) The following documents are cited:

- D1: BOLDT M ET AL: 'Modeling an ATM-based access network for 3rd generation mobile communication networks' VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4
- D2: GB-A-2 322 515 (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26)
- D3: BYUNG-HAN RYU ET AL: 'Performance evaluation for low bit-rate voice traffic in IMT-2000 network' PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954 1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6
- D4: EP-A-0 915 634 (LUCENT TECHNOLOGIES INC) 12 May 1999 (1999-05-12)

- 2) Since the claimed invention is not disclosed by a single known pre-published document, the requirements of Articles 33(1) and (2) PCT with respect to novelty are met.

Moreover, the claimed invention is clearly industrially applicable within the meaning of Articles 33(1) and (4) PCT.

- 3) As the applicant admits in the introductory part of the description, telecommunications networks (ie mobile phone networks using AAL-2 over ATM to link the base stations to the RNCs) as per the pre-characterizing part of claim 1 are generally known in the art. In this respect attention is drawn to D1 (document

in general, but abstract and introduction in particular). Although no explicit mention is made in D1 or W-CDMA or sectored base stations, this is at least implicitly disclosed in any document dealing with UMTS (which is the case with D1). In this respect it is in any case noted that for the operation of the invention, sectored base stations seem not to be essential, merely preferred for cells with lots of traffic (page 6 paragraph starting "As also shown in ...") and what is important is that there are a plurality of termination points, either from a plurality of single sector base stations or from a multi-sectored base station. This is also shown by figure 2 of the current application.

The application (see in particular discussion of figure 1) explicitly mentions that it is known in the art that the AAL-2 over ATM stream from each termination point includes a plurality of calls, each identified by a call id. As far as the ATM network connected to the telecommunication network is concerned, the actual data is, however, irrelevant.

The problem for the ATM network is that such networks are costly, and that owing to timer constraints, these resources are inefficiently used if the incoming data stream mainly comprises dummy data (see also page 3 3rd paragraph of the application).

It is noted that D1 gives a hint that the problem that the current application aims to overcome is known in the field of UMTS (cf page 2590, right column, first paragraph " ... only partially fill the cell ... may introduce delay").

More particularly, it seems that although not explicitly mentioned, the application aims to use ATM switching resources more efficiently, as shown by the fact that the streams (including much dummy data) are fed in parallel to the switch and only there are the streams arranged into filled ATM cells.

This problem of efficiently mapping the AAL-2 streams onto ATM connections lies totally in the field of ATM. Thus the skilled man with this problem to solve would be a skilled man in the field of ATM (see also PCT Guidelines IV-8.6) with a knowledge of ATM and an overview of the content of general ATM documents such as D2. He would realize that D2 (cf in particular page 4 line 31 - page 5 line

6) discloses a suitable solution to the problem to be solved in the current application. In this respect as pointed out above, precisely where the multiplex means is located seems not to be of importance in the current application, so long as the multiplexing occurs before switching, which is clearly the case in D2.

In incorporating this solution from D2 into the generally known type of communications network the skilled man would thus arrive at the subject matter of claim 1 without performing an inventive step. Claim 1 thus fails to meet the requirements of Articles 33(1) and (3) PCT.

- 3) Independent claim 6 relates to similar matter to the above, but for the ATM switch itself, rather than for the network.

Independent claim 7 relates for the method category to apparatus claim 1.

The comments made above with respect to claim 1 thus apply to these claims also, which likewise fail to meet the requirements of Articles 33(1) and (3) PCT due to the lack of an inventive step of their subject matters.

- 4) The additional features of claims 2 and 3 are obvious in the light of D2 (cf above cited passages, figure 1 and passages cited in search report).

The additional features of claims 4 and 5 (in respect of which attention is drawn to 5.iv below) are design details within the capability of the skilled man to implement.

None of the dependent claims thus adds anything of inventive significance to claim 1.

- 5) For the sake of completeness the following is noted:

- i The independent claims should have been put in the correct two part form recommended by Rule 6.3(b) PCT with a pre-characterising part reflecting the teachings of the closest prior art.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/07210

- ii In order to meet the requirements of Rule 6.2(b) PCT reference signs in parenthesis should have been added to the method claim.
- iii In order to meet the requirements of Rule 5.1(a)(ii) PCT, at least the documents D1 and D2 should have been cited in the description and briefly discussed.
- iv Dependent claims 4 and 5 find no support in the description and thus fail to meet the requirements of Article 6 PCT.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
COHAUSZ & FLORACK
Kanzlerstrasse 8a
D-40472 Düsseldorf
GERMANY

Eingang:	22.06.2000
Frist bis:	22.07.2000
Bearbeiter:	SC

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year) 18/05/2000

Applicant's or agent's file reference

SC/ar 990730WO

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/EP 99/07210

International filing date
(day/month/year)

29/09/1999

Applicant

NOKIA NETWORKS OY

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the International application will be published by the International Bureau.

If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the International application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Theresia Van Deursen

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SC/ar 990730W0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 99/ 07210	International filing date (day/month/year) 29/09/1999	(Earliest) Priority Date (day/month/year)
Applicant NOKIA NETWORKS OY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BOLDT M ET AL: "Modeling an ATM-based access network for 3rd generation mobile communication networks" VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4 * sections I-IV *	1,6,7
Y	GB 2 322 515 A (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26) page 7, line 8 - line 9 page 8, line 1 - line 3 -- -/-	1,6,7

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

4 May 2000

Date of mailing of the international search report

18/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gregori, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BYUNG-HAN RYU ET AL: "Performance evaluation for low bit-rate voice traffic in IMT-2000 network" PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954 1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6 * sections I-IV *	1-7
A	EP 0 915 634 A (LUCENT TECHNOLOGIES INC) 12 May 1999 (1999-05-12) figure 1 column 6, line 39 - line 49 column 8, line 39 - line 54	1,6,7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/07210

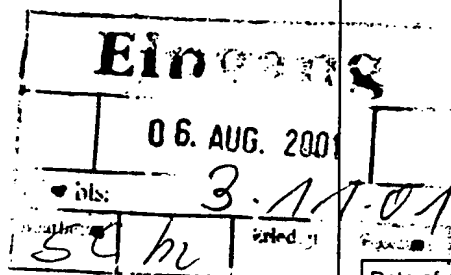
Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2322515	A	26-08-1998	EP 0962117 A	08-12-1999
			WO 9837728 A	27-08-1998
EP 0915634	A	12-05-1999	JP 11225150 A	17-08-1999

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

COHAUSZ & FLORACK
Kanzlerstrasse 8a
D-40472 Düsseldorf
ALLEMAGNE



PCT

WRITTEN OPINION

(PCT Rule 66)

Applicant's or agent's file reference SC/wa 990730WO		REPLY DUE within 3 month(s) from the above date of mailing	
International application No. PCT/EP99/07210	International filing date (day/month/year) 29/09/1999	Priority date (day/month/year) 29/09/1999	
International Patent Classification (IPC) or both national classification and IPC H04Q11/04			
Applicant NOKIA NETWORKS OY et al			

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain document cited
VII	<input checked="" type="checkbox"/>	Certain defects in the international application
VIII	<input checked="" type="checkbox"/>	Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
 For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
 For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **29/01/2002.**

Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer / Examiner Hodgins, W <hr/> Formalities officer (incl. extension of time limits) Finnie, A Telephone No. +49 89 2399 8251
---	--



I. Basis of the opinion

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-7 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/EP99/07210

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	
Inventive step (IS)	Claims	1-7
Industrial applicability (IA)	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Concerning Point V

- 1) The following documents are cited:

- D1: BOLDT M ET AL: 'Modeling an ATM-based access network for 3rd generation mobile communication networks' VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4
- D2: GB-A-2 322 515 (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26)
- D3: BYUNG-HAN RYU ET AL: 'Performance evaluation for low bit-rate voice traffic in IMT-2000 network' PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954 1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6
- D4: EP-A-0 915 634 (LUCENT TECHNOLOGIES INC) 12 May 1999 (1999-05-12)

- 2) As the applicant admits in the introductory part of the description, telecommunications networks (ie mobile phone networks using AAL-2 over ATM to link the base stations to the RNCs) as per the pre-characterizing part of claim 1 are generally known in the art, for example from D1 or D3 (see for example introduction of D1).

The problem to be solved in the current application is summarized on page 3 (3rd paragraph), and lies totally in the field of ATM, namely in the problem of efficiently mapping the calls into ATM connections, given timing constraints. Thus the skilled man with this problem to solve would consult general ATM documents such as D2 for solutions. He would realize that D2 (cf in particular page 4 line 31 - page 5 line

6) discloses a suitable solution to the problem to be solved in the current application. In this respect it is further pointed out that precisely where the multiplex means is located seems not to be of importance in the current application, so long as the multiplexing occurs before switching.

In incorporating this solution from D2 into the generally known type of communications network he would arrive at the subject matter of claim 1 without performing an inventive step. Claim 1 thus fails to meet the requirements of Articles 33(1) and (3) PCT.

Moreover, it is noted additionally that D1 seems to identify the problem that the current application aims to overcome (cf page 2590, right column, first paragraph "... only partially fill the cell ... may introduce delay"). The problem to be solved is thus known even in the field of UMTS. D1 even seems to hint at the solution (page 2591, right column, section "Intermediate Unit", last sentence "multiplexed into ATM cells". In the light of this it also seems that the claimed solution (essentially "if spare capacity on line, multiplex several calls onto line") could be viewed as being obvious in the light of D1 taken on its own.

- 3) Independent claim 6 relates to similar matter to the above, but for the ATM switch itself, rather than for the network.

Independent claim 7 relates for the method category to a apparatus claim 1.

The comments made above with respect to claim 1 thus apply to these claims also, which likewise fail to meet the requirements of Articles 33(1) and (3) PCT due to the lack of an inventive step of their subject matters.

- 4) The additional features of claims 2 and 3 are obvious in the light of D2 (cf above cited passages, figure 1 and passages cited in search report).

The additional features of claims 4 and 5 (in respect of which attention is drawn to Point VIII below) are design details within the capability of the skilled man to implement.

None of the dependent claims thus adds anything of inventive significance to claim 1.

- 5) It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable an independent claim including such matter should be filed.

The applicant should also indicate in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof.

Concerning Point VII

- 1) The independent claims should be put in the correct two part form recommended by Rule 6.3(b) PCT with a pre-characterising part reflecting the teachings of the closest prior art.
- 2) In order to meet the requirements of Rule 6.2(b) PCT reference signs in parenthesis should be added to the method claim.
- 3) In order to meet the requirements of Rule 5.1(a)(ii) PCT, at least the documents D1 and D2 should be cited in the description and briefly discussed.
- 4) If necessary, the description should be brought into conformance with any newly filed claims (Rule 5.1(a)(iii) PCT).
- 5) Article 34(2)(b) PCT must be observed when amending.

Concerning Point VIII

Dependent claims 4 and 5 find no support in the description and thus fail to meet the requirements of Article 6 PCT.

PCT

REC'D 12 FEB 2002

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

8


Applicant's or agent's file reference SC/wa 990730WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/07210	International filing date (day/month/year) 29/09/1999	Priority date (day/month/year) 29/09/1999
International Patent Classification (IPC) or national classification and IPC H04Q11/04		
Applicant NOKIA NETWORKS OY et al		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 07/03/2001	Date of completion of this report 08.02.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hodgins, W Telephone No. +49 89 2399 8987



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/07210

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-7 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/07210

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-7
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 1-7
Industrial applicability (IA)	Yes: Claims 1-7
	No: Claims

**2. Citations and explanations
see separate sheet**

Concerning Point V

- 1) The following documents are cited:

- D1: BOLDT M ET AL: 'Modeling an ATM-based access network for 3rd generation mobile communication networks' VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4
- D2: GB-A-2 322 515 (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26)
- D3: BYUNG-HAN RYU ET AL: 'Performance evaluation for low bit-rate voice traffic in IMT-2000 network' PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954 1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6
- D4: EP-A-0 915 634 (LUCENT TECHNOLOGIES INC) 12 May 1999 (1999-05-12)

- 2) Since the claimed invention is not disclosed by a single known pre-published document, the requirements of Articles 33(1) and (2) PCT with respect to novelty are met.

Moreover, the claimed invention is clearly industrially applicable within the meaning of Articles 33(1) and (4) PCT.

- 3) As the applicant admits in the introductory part of the description, telecommunications networks (ie mobile phone networks using AAL-2 over ATM to link the base stations to the RNCs) as per the pre-characterizing part of claim 1 are generally known in the art. In this respect attention is drawn to D1 (document

in general, but abstract and introduction in particular). Although no explicit mention is made in D1 or W-CDMA or sectorized base stations, this is at least implicitly disclosed in any document dealing with UMTS (which is the case with D1). In this respect it is in any case noted that for the operation of the invention, sectorized base stations seem not to be essential, merely preferred for cells with lots of traffic (page 6 paragraph starting "As also shown in ...") and what is important is that there are a plurality of termination points, either from a plurality of single sector base stations or from a multi-sectorized base station. This is also shown by figure 2 of the current application.

The application (see in particular discussion of figure 1) explicitly mentions that it is known in the art that the AAL-2 over ATM stream from each termination point includes a plurality of calls, each identified by a call id. As far as the ATM network connected to the telecommunication network is concerned, the actual data is, however, irrelevant.

The problem for the ATM network is that such networks are costly, and that owing to timer constraints, these resources are inefficiently used if the incoming data stream mainly comprises dummy data (see also page 3 3rd paragraph of the application).

It is noted that D1 gives a hint that the problem that the current application aims to overcome is known in the field of UMTS (cf page 2590, right column, first paragraph " ... only partially fill the cell ... may introduce delay").

More particularly, it seems that although not explicitly mentioned, the application aims to use ATM switching resources more efficiently, as shown by the fact that the streams (including much dummy data) are fed in parallel to the switch and only there are the streams arranged into filled ATM cells.

This problem of efficiently mapping the AAL-2 streams onto ATM connections lies totally in the field of ATM. Thus the skilled man with this problem to solve would be a skilled man in the field of ATM (see also PCT Guidelines IV-8.6) with a knowledge of ATM and an overview of the content of general ATM documents such as D2. He would realize that D2 (cf in particular page 4 line 31 - page 5 line

6) discloses a suitable solution to the problem to be solved in the current application. In this respect as pointed out above, precisely where the multiplex means is located seems not to be of importance in the current application, so long as the multiplexing occurs before switching, which is clearly the case in D2.

In incorporating this solution from D2 into the generally known type of communications network the skilled man would thus arrive at the subject matter of claim 1 without performing an inventive step. Claim 1 thus fails to meet the requirements of Articles 33(1) and (3) PCT.

- 3) Independent claim 6 relates to similar matter to the above, but for the ATM switch itself, rather than for the network.

Independent claim 7 relates for the method category to apparatus claim 1.

The comments made above with respect to claim 1 thus apply to these claims also, which likewise fail to meet the requirements of Articles 33(1) and (3) PCT due to the lack of an inventive step of their subject matters.

- 4) The additional features of claims 2 and 3 are obvious in the light of D2 (cf above cited passages, figure 1 and passages cited in search report).

The additional features of claims 4 and 5 (in respect of which attention is drawn to 5.iv below) are design details within the capability of the skilled man to implement.

None of the dependent claims thus adds anything of inventive significance to claim 1.

- 5) For the sake of completeness the following is noted:

- i The independent claims should have been put in the correct two part form recommended by Rule 6.3(b) PCT with a pre-characterising part reflecting the teachings of the closest prior art.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/07210

- ii In order to meet the requirements of Rule 6.2(b) PCT reference signs in parenthesis should have been added to the method claim.
- iii In order to meet the requirements of Rule 5.1(a)(ii) PCT, at least the documents D1 and D2 should have been cited in the description and briefly discussed.
- iv Dependent claims 4 and 5 find no support in the description and thus fail to meet the requirements of Article 6 PCT.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SC/ar 990730W0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 99/ 07210	International filing date (day/month/year) 29/09/1999	(Earliest) Priority Date (day/month/year)
Applicant NOKIA NETWORKS OY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the International search was carried out on the basis of the International application in the language in which it was filed, unless otherwise indicated under this item.

☐ the International search was carried out on the basis of a translation of the International application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the International application, the International search was carried out on the basis of the sequence listing:

☐ contained in the International application in written form.

☐ filed together with the International application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the International application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BOLDT M ET AL: "Modeling an ATM-based access network for 3rd generation mobile communication networks" VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION (CAT. NO.98CH36151), VTC '98. 48TH IEEE VEHICULAR TECHNOLOGY CONFERENCE. PATHWAY TO A GLOBAL WIRELESS REVOLUTION, OTTAWA, ONT., CANADA, 18-21 MAY 1998, pages 2590-2593 vol.3, XP002136953 1998, New York, NY, USA, IEEE, USA ISBN: 0-7803-4320-4 * sections I-IV * ---	1,6,7
Y	GB 2 322 515 A (NORTHERN TELECOM LTD) 26 August 1998 (1998-08-26) page 7, line 8 - line 9 page 8, line 1 - line 3 ---	1,6,7

-/--



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

4 May 2000

Date of mailing of the international search report

18/05/2000

Name and mailing address of the ISA

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Authorized officer

Gregori, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/07210

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BYUNG-HAN RYU ET AL: "Performance evaluation for low bit-rate voice traffic in IMT-2000 network" PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INFORMATION INFRASTRUCTURE' (CAT. NO.99CH37030), PROCEEDINGS OF IEEE. IEEE REGION 10 CONFERENCE. TENCON 99. 'MULTIMEDIA TECHNOLOGY FOR ASIA-PACIFIC INF, 15 - 17 September 2000, pages 238-241 vol.1, XP002136954 1999, Piscataway, NJ, USA, IEEE, USA ISBN: 0-7803-5739-6 * sections I-IV *	1-7
A	EP 0 915 634 A (LUCENT TECHNOLOGIES INC) 12 May 1999 (1999-05-12) figure 1 column 6, line 39 - line 49 column 8, line 39 - line 54	1,6,7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/07210

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2322515	A	26-08-1998	EP 0962117 A	08-12-1999
			WO 9837728 A	27-08-1998
EP 0915634	A	12-05-1999	JP 11225150 A	17-08-1999